

APPENDIX A – FAUNAL ANALYSIS REPORT (ZIEGLER 2003) AND CATALOG

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M E M O R A N D U M

DATE: 13 May 2003
TO: Garcia and Associates
(Attn.: Alice K.S. Roberts)
FROM: Alan C. Ziegler, Zoological Consultant
SUBJECT: Identification of faunal material from GANDA PTA Project 2049
(several vertebrate faunal lots from Sites 21299, 23464 and
23626, received 1 April 2003)

I have identified this faunal material to the lowest taxonomic level possible for me, and am returning all of it to you in one box along with this MEMO. An INVOICE covering the 6 hours spent on this job is also included here.

Along with this PTA material, I am sending you the identified GANDA Mākua Project vertebrate lot. The latter material is accompanied by a MEMO dated 12 May 2003 describing my general identification procedures, and a vertebrate Faunal Category List revised 12 May 2003, which also includes all of the presently identified PTA faunal categories. Thus I will not repeat all of that MEMO information here, nor provide another copy of the Faunal Category List, because you will have available the two Mākua-related documents. If, however, you should need separate copies for this PTA material, I can promptly provide them to you.

The present collective lot of material consists essentially entirely of bird remains, almost all of the identifiable among these being of two or conceivably more species of the family Procellariidae (Shearwaters and Petrels). I presume all of these remains are human food midden, probably but not certainly of Hawaiians at least occasionally utilized sites in this general "Saddle Area" in pre-Contact and/or early post-Contact time. I will enter a few observations and comments below that refer primarily to this procellariid material.

Site 21299 and TU 1 of Site 23626 contain much procellariid material that was obviously mostly burned and reburied in fireplaces. Helen James at the Smithsonian Institution, and I have done most of the past identification of the bird material from "Saddle Area" sites. Neither of us, however, has been able to determine the identification(s) of the "Small Procellariid" submitted to us. This is because of the fragmentation--and often an undetermined amount of warpage and shrinking of the material occasioned by long-continued exposure to fire. (Presumably, bones of these and most other birds were simply disposed of in fireplaces following consumption of the meat, with these hearths being constantly reused as humans visited a number of times.)

The unusual thing, however, is that I do not know of any record that any procellariid in this size range ever nested in the "Saddle Area." I think it may possibly be that this small procellariid material is derived from trail provisions brought up from some Hawai'i Island Coast(s) by Hawaiians travelling over the area.

There are historic records of the medium-sized procellariid "*Pterodroma phaeopygia*" (Hawaiian Petrel) nesting in the "Saddle Area," and some may still do so. Concentrations of its butchered skeletons--most often unburned for some enigmatic reason--are found in a number of selected lava-blister caves there. Your

(MEMO: Garcia and Associates from A.C. Ziegler, 13 May 2003, page 2.)

material of this medium-sized species from Site 21299 and TU 1 of Site 23626 contains what probably constitutes only a minority of the total procellariid bones present. I may be correct when I opine that this is possibly generally less intensely fired than that of the one or more smaller procellariids, meaning the smaller type of bird was being deposited in the fireplaces earlier than was the Hawaiian Petrel. I have no way of backing up this supposition, however.

Site ~~23464~~ and TU 2 of Site 23626 contain almost entirely remains of "Medium Procellariid" (presumably all "*Pterodroma phaeopygia*"). If these individuals were cooked before consumption, the heat seems not to have significantly altered the bones. I suggest they were human fare because the limb bones exhibit what I term--for want of an established term--"end-breakage." This appears to have been the result of a traditional Hawaiian precooking butchering technique in which at least the major bones of birds' skeletons were separated--usually roughly but occasionally very cleanly--at the joints utilizing a basalt or volcanic glass flake fragment or other lithic implement, and thus damaging only the terminal several millimeters of the bones. (If this "end-breakage" were due simply to previously deposited bones being broken underfoot, it would be expected that the breakage would most often occur somewhere along the shaft rather than at the extreme terminal portions.) I have no sure idea why this type of butchering was employed, but it appears to have been used--especially, but not exclusively, for seabirds--at a number of apparently traditional sites on various main Hawaiian Islands.

I hope the foregoing information will be of interest and use to you, Thank you very much for letting me see this material, and be sure to let me know if there are questions on any of my work or attempted interpretations. Continued best in everything!

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MEMORANDUM

DATE: 26 May 2003
TO: Garcia and Associates
(Attn.: Alice K.S. Roberts)
FROM: Alan C. Ziegler, Zoological Consultant
SUBJECT: Identification of faunal material from GANDA PTA Project 2049
(several vertebrate faunal lots from Site 19490, TU 1, Fea. C),
received 14 May 2003

I have identified this faunal material to the lowest taxonomic level possible for me, and am returning all of it to you in one box along with this MEMO. An INVOICE covering the 49 hours spent on the identifications and writeup of this job is also included here.

Each of the labeled plastic bags I received contained the (primarily) vertebrate faunal remains from a discrete excavation unit of Site 19490, TU 1, Fea. C (i.e., from a particular Layer/Level). For each of these excavation units I have identified and separated the material into various faunal categories, and placed the remains of each category in an individual stapled plastic bag along with a yellow paper slip giving the name of the particular category represented and, sometimes, a pertinent comment on the material (--but, note, to keep the identification time to a minimum, not the provenience, which appears only on your original labeled container bag still accompanying the corresponding material).

All of these lots of stapled bags from each excavation unit have then been put back in your original labeled container bag. These various stapled bags with yellow paper identification slips are arranged within each original labeled bag in the same order as the category names appear on the Faunal Category List described below.

Any remains identified as "Artifact" have similarly been placed in individual stapled bags, with an identification of the faunal item or nonfaunal substance apparently represented by the original raw material. Additionally, I also segregated and saved in individual stapled plastic bags any invertebrate and non-faunal items encountered--although I realize you may not need some of them.

The transparency of the stapled faunal-category bags, of course, allows counting of the contained skeletal items of at least the less-well-represented categories without the time and trouble of removing the material. Even in the case of possible future weighing of the material, I might note that this could also be done without opening the bag because each of these stapled bags is of the same weight as all of the others, bears one staple, and contains a single paper-slip label of uniform weight; thus you should be able to deduct an identical tare weight throughout any in-bag weighing procedure.

To explain the faunal categories used for the current material, I have included with this MEMO a 26 May 2003 revision of a Faunal Category List. This is essentially the same list used for earlier Garcia and Associates work, which still contains all previously identified categories (whether or not they appeared in the present lot of material) but which has been updated to include three new faunal categories found during the present work.

It should be noted in this List that when I mention the common or scientific name of genera or species in explanations of the more-generalized faunal categories--as, for example, in "Medium Bird" or "Small-to-Medium Mammal"--unless it is obviously indicated otherwise, I intend these names to convey only an idea of the

(MEMO: Garcia and Associates from A.C. Ziegler, 26 May 2003, page 2.)

general size of the animal represented rather than to definitely indicate that any specific taxon mentioned is necessarily present in the material.

For some identifications on the yellow paper slips, I have prefixed the name of a family, genus, or species with "cf.". This means that the material seems extremely close osteologically to the taxon named and quite likely belongs to it, but I cannot entirely rule out the possibility that an extinct, accidental, or extremely rare, morphologically similar form--although, usually of the same order, family, or genus--is represented instead. For most later compilation purposes, however, I would advise simply omitting the "cf." whenever you see it in my identifications (--I guess the main reason I use it at all is to let any possible future identifiers examining the bones know that I did realize that in some cases there was an alternative, although unlikely, identification possible).

In regard to minimum number of individuals, if it was obvious that more than one individual was represented by the material in the stapled bag, I have noted on the yellow paper identification slip the number indicated (written as "MNI = ...").

In the case of any fish remains, whenever vertebrae were present (other than those of sharks, rays, and--usually--eels) I have given approximate total lengths of the particular individuals involved (written as "Len's. = ..."), based on comparison of vertebra size with that of prepared skeletal specimens of known length. These estimates could well be off by perhaps 20-30% (depending on species represented and position of the vertebrae in the spinal column) but they will serve to give you at least a general idea of the size of many of the fish present.

I have not attempted to chronologically age any bird individuals whose bones appear in the faunal material, except to note on the yellow paper slips any obviously immature bones present (usually indicating nestlings in species other than chicken and other precocial ground-living birds), lack of any such notation meaning that the bones are apparently of adult individuals. For mammals other than rodents, whenever possible I have endeavored to give a general idea of age at death (in the case of appropriate material often estimating the probable minimum and/or maximum chronological age at death by reference to published tables--when available--of dental replacement sequence or stage of long-bone epiphyseal union).

You may already routinely present the following in each of your archaeological excavation reports but, in case you do not, I hope you will consider including a minimal faunal-data table in each such final paper. That is, a simple table (similar to the sample included as an ATTACHMENT to this MEMO) for each site or other test unit, giving at least the actual numbers and/or weights of the bones/fragments per level assigned to each faunal category that occurs in the excavation unit. This is so possible future investigators will always have available these raw faunal data, along with other information such as midden volumes contained in your report, for use in faunal analysis calculations that, for one reason or another, you may not have carried out.

As I mentioned to Garcia and Associates personnel previously, I usually do not write up a formal faunal analysis report per se (--having found that, in terms of the amount that would have to be paid for my time, this is much more expeditiously done by personnel who either actually participated in the field work or, at least, have more ready access to the complete original excavation data than I do--) but, instead, I provide a series of general and specific, largely subjective, comments (as I have done below) regarding the identified faunal material. (I would assume these comments would be more meaningful to you when considered jointly with any tabulation you may make of the material.) These comments can then be quoted or paraphrased, or the information contained in them otherwise utilized in the manner most suitable to the style of the final overall project report.

COMMENTS ON GANDA PTA PROJECT 2049, SITE 19490, VERTEBRATE FAUNAL MATERIAL

GENERAL. I had previously submitted to you a MEMO dated 13 May 2003 regarding other PTA Project 2049 material identified at that time. Among the various COMMENTS of that MEMO were a number that apply essentially equally well to the

(MEMO: Garcia and Associates from A.C. Ziegler, 26 May 2003, page 3.)

present PTA Project 2049 material, so you might care to review and consider these earlier COMMENTS along with those of the present MEMO. Still especially pertinent in regard to the present material are the previous remarks concerning the highly burned condition of "Small Procellariid" bones, as well those about the "end-breakage" of "Medium Procellariid"/"*Pterodroma phaeopygia*" bones. I might add below a few additional observations based largely on the current Site 19490 bones.

At least the general aspect of the Site 19490 vertebrate faunal assemblage is quite similar to the collective one of the earlier lots from Sites in the series 21299 through 23626, and both seem unquestionably to comprise almost entirely remains of animals eaten by humans. Most of the human occupation of all these sites likely occurred in the pre-Contact Period, or during it and only the earlier part of the post-Contact Period before historically introduced vertebrate species became common in the general Saddle Area.

Sites 21299 through 23626 lack historically introduced species, but the Site 19490 lot has the remains of two such vertebrate types: a "Small Galliform" (quail-sized species of this avian order) and a "*Capra hircus/Ovis* sp." (Domestic Goat/Sheep). Birds and mammals of these particular types have been in the Saddle Area for at least a century and a half, and are still commonly hunted there).

Very occasional fish remains appear in Site 19490, mostly represented by vertebrae indicating quite small individuals (i.e., between about 10 and 15 or 20 cm long). Because of the low number of bones, and the small size of the fishes, I suspect these were not human food items carried up from a coastal area as provisions, but were likely stomach contents of "*Pterodroma phaeopygia*" (Hawaiian Petrel) individuals that had very recently flown into the Saddle Area after feeding in the ocean, and were then captured by humans. The relatively few individuals of the Polynesian-introduced and still-extant "*Rattus exulans*" (Polynesian Rat) represented in the deposit were presumably simply animals infesting the human habitation and dying by various means other than by being deliberately obtained as food by the inhabitants. Dogs may well have accompanied the humans at the site, but the virtual absence of their remains indicates they were seldom if even eaten here.

Three bird species appear in Site 19490 for the first time in all of your Project 2049 material to date. These are: "*Oceanodroma castro*" (Band-rumped Storm Petrel, presumably always a coastal nester, although apparently not historically recorded as doing this anywhere on Hawai'i Island, at least in the last century or two), "*Branta sandvicensis*" (Hawaiian Goose), and "*Porzana* sp." (a small flightless rail, of which all two or three original Hawai'i Island species have been extinct since at least the 1880s). All these three types of birds, along with "*Asio flammeus*" (Short-eared Owl) and "Small Passeriform" birds, occur only very sparingly in the deposit, though, so such individuals were probably occasionally taken only opportunistically in the course of other activities, rather than as the result of organized hunts for them by the human inhabitants. As I recall, I identified remains of this storm petrel at least fairly commonly in material from Bobcat Trail Cave, a Saddle Area site excavated by Paul H. Rosendahl, Ph.D., Inc., in the 1980s. I presume this Bobcat Trail Cave storm petrel material represents individuals taken at nesting sites on some Hawai'i Island coast, and carried up to the cave as provisions. I have not seen the PHRI report on this site (if any) but, as I recollect, my general subjective impression from examining its overall vertebrate material was that the cave served as a more-usual, perhaps family-oriented, site than did other, evidently somewhat temporary, Saddle Area sites from which I have seen vertebrate remains.

(MEMO: Garcia and Associates from A.C. Ziegler, 26 May 2003, page 4.)

Among the Site 19490 otherwise unidentified "Small Procellariid" material are two proximal tibiotarsus fragments almost surely belonging to a smaller form of the genus *Pterodroma*. Presumably, these represent "*Pterodroma jugabilis*" (Gracile Petrel) and/or "*Pterodroma hypoleuca*" (Bonin Petrel). Both are--or were--evidently coastal nesters, and both apparently became extinct in the Main Hawaiian Islands shortly before or not long after Contact.

I am a little surprised at the presence of the fair number of apparent bird egg-shell fragments in the Site 19490 material, because I had always been led to believe traditional Hawaiians did not eat bird eggs. It is possible, of course, that these fragments were from eggs deliberately sought out for food--as from burrows of "*Pterodroma phaeopygia*," or occasionally encountered nests of the Hawaiian Goose or even of the ground-nesting "*Asio flammeus*." But at least some of the eggs could have possibly been obtained in a less direct manner; they may have been fully formed ones found in the oviducts of female Hawaiian Petrels captured as they returned to the Saddle Area to lay these eggs in the nesting burrows. If somehow obtained from Hawaiian Petrels, life-history data for the species indicates this time of adult capture or egg collection from burrows would have been about May and June. If the eggs were from the Hawaiian Goose they could have been obtained from about October through March, while from the Short-eared Owl eggs could apparently have been obtained essentially year-round. (I presume that no medium-sized bird species ever nested directly at Site 19490 often enough and over a long enough time period to have produced the quantity of egg-shell fragments present from its own nesting activities.)

There are a total of at least 15 bird wing bones deliberately modified and apparently utilized by humans, all segregated as "Artifact," in the Site 19490 material. These are all of a type usually termed "awls" or "picks," although no one knows for sure the primary purpose of such items. It is often assumed--if not always stated--that they were used for removing limpets (primarily *Cellana* spp. [*Opihi*]) from their shells (--but from long-time personal collection and consumption of these limpets I can say unequivocally that no such implement is necessary, simply a thumbnail or empty shell of the same species is perfectly adequate) or for removing the operculum of (necessarily cooked) snail-shaped marine gastropods (--for which, indeed, such a bird-bone "pick" may serve very well; I personally use the leather punch of a Swiss Army knife). The fact that the present rather significant number of such artifacts are from a site far from any coast (where most of the traditional Hawaiian sites thus far investigated occur--and therefore from which most such bird-bone implements have previously been reported), and which contains essentially no marine mollusk material, is a strong indication that such bird-bone implements must have served a different primary--or at least an additional important--purpose for traditional Hawaiians. I would like to suggest that use of such implements might well have been involved in weaving or plaiting leaves of *Pandanus odoratissimus* (*Pū hala*) and *Cyperus laevigatus* (*Nakaloa*), certainly almost everyday occupations of pre-Contact Hawaiian women. (I think it might add to the possible validity of this suggestion to point out that some modern-day instructors in *Lau hala* weaving instruct students to obtain and use a small common-point screwdriver as a fid to aid in inserting one individual narrow strand of leaf under another.)

I might add here an incidental observation concerning bones in the current Site 19490 material, although I really have no idea of its significance--if any. In the "Medium Bird" material of Bag 113 (Layer/Level III/3, 40-50 dbs) I fairly consistently found some pedal phalanges (probably but not certainly of "*Pterodroma phaeopygia*" or, at least, of medium-sized procellariid) that were still generally entire but thoroughly splintered longitudinally throughout most of the proximal portions. (By no means were all of these skeletal elements recovered found in this

(MEMO: Garcia and Associates from A.C. Ziegler, 26 May 2003, page 5.)

condition, but there were enough present to indicate the splintering was probably not accidental but was due to some deliberate human action.) The primary reason I call attention to this phalanx splintering is that I remember seeing it in material from only one other area in the Main Hawaiian Islands, from most of which I have examined much archaeological material. This other general site area comprised Mauna Kea Adz Quarry shelters at about 11,000 feet elevation on the mountain, excavated by Patrick C. McCoy in the 1970s. The splintered phalanges were almost surely not reduced to this condition upon mastication and subsequent ingestion by dogs, because the bones bear no indication of the corrosion caused by passage through this type of carnivore's digestive tract. I do not know how humans caused the splintering but would think it could be duplicated by chewing fresh, salted, and/or cooked bird feet, and spitting out the bones after separating and swallowing the edible fleshy portions. (Use of such bird feet should probably not be considered unusual--I know at least cooked chicken feet are a Chinese or other Asian food item; I am just rather curious why these sort of splintered pedal phalanges of birds do not appear more frequently in traditional Hawaiian sites, where procellariids were among the more common of birds consumed.)

Finally, I might note here the rather obvious fact that there are a relatively very great number of bird bones/bone fragments in the Site 19490 material, over 99% of which--by either weight or number--I have categorized as either "*Pterodroma phaeopygia*," "Medium Procellariid," "Small Procellariid," or "Medium Bird." It seems a shame to let at least potentially valuable information from at least the last three of these categories possibly remain unused. I am certainly no statistician--or even mathematician--but I do understand that increases in sample sizes usually increase the validity of statistical results. Thus, if you are going to carry out any detailed calculations on quantities of vertebrate material from Site 19490, I wonder if you might consider the possible reasonableness of incorporating the following procedure in conjunction with such work. It seems that, because the only certainly identified species of medium-sized procellariid here is "*Pterodroma phaeopygia*," that essentially all of the "Medium Procellariid" material is of this same species, so it might validly be combined with the "*Pterodroma phaeopygia*" material for at least some computation purposes. Following the same line of reasoning, well over 95% of the "Medium Bird" material is almost surely made up of otherwise unidentified remains of "*Pterodroma phaeopygia*," "Medium Procellariid," and "Small Procellariid." Thus, this total amount of "Medium Bird" material could be divided into two tentative "working" categories: "*Pterodroma phaeopygia*" (now incorporating all of the formerly designated "Medium Procellariid" material), and "Small Procellariid;" the division being made in the same ratio as the amount of the material in each of these two categories would bear to the other. For final figures, there would then be only the quantities of two categories to compare: that is, on the one hand the combined figure for my originally labelled categories of "*Pterodroma phaeopygia*" and of "Medium Procellariid," along with the pertinent working apportionment of "Medium Bird," and on the other the combined figure for my originally labelled category of "Small Procellariid" along with the pertinent working apportionment of "Medium Bird."

I hope the foregoing, sometimes rather eclectic, collection of information will be of interest and use to you, Thank you very much for letting me see this most interesting material, and be sure to let me know if there are questions on any of my procedures, identifications, COMMENTS, or attempted interpretations. Continued best in everything!

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